CIRM grantees directly create neuronal stem cells for research and therapies

Posted: April 26, 2011

Created: 26/04/2011 - 13:47

CIRM grantees at the Scripps Research Institute, University of California, San Diego and Sanford-Burnham Research Institute have taken an intriguing step toward producing neural progenitor cells for research or therapies. The team, led by Sheng Ding who has recently moved to the Gladstone Institutes in San Francisco, started with mouse skin cells and converted them directly to an early stage of neural cell. The work was published in the April 26 online issue of Proceedings of the National Academy of Sciences.

This work falls somewhere between two other pieces of research starting with skin cells. Since 2006 it has been possible to convert mouse skin cells into reprogrammed iPS cells that are similar to embryonic stem cells in their ability to create all cell types. Scientists could then mature those cells into whatever cell type they are interested in studying.

Over the past year, other groups have started with skin and converted those cells directly to neurons or heart cells.

Ding and his colleagues fall somewhere in the middle, sidestepping some issues with both direct reprogramming and generating iPS cells.

- Converting skin directly into neurons has the major limitation that neurons can't divide. The number of neuronal cells available for research or therapies is limited by the number of starting skin cells.
- Going all the way back to iPS cells has limitations of its own. The cells multiply in a lab dish to create as many cells as a scientist might need for therapies or research uses, but maturing those cells into the appropriate cell type can be an arduous task any traces of the original iPS cells could lead to tumors.

Converting skin to these neural precursors avoids both problems. Those neural cells are already pushed down the pathway to become neurons, and they can multiply. The researchers also showed that the cells can integrate into a mouse brain without developing tumors. In a press release from the Gladstone Institutes, Ding says:

> "These cells are not ready yet for transplantation," Dr. Ding said. "But this work removes some of the major technical hurdles to using embryonic stem cells and iPS cells to create transplant-ready cells for a host of diseases."

That's all good, but the work is a long way from ending the need for iPS cells. First, it's in mice. There's no evidence yet that the protocol will work with human cells. Also, the resulting neural progenitors can only divide a few times, so they aren't an unlimited source of cells.

Those caveats aside, it's exciting to watch how quickly the field is evolving. Not long ago, the idea of converting one cell type into another was nothing but a dream. Now, scientists (many of them CIRM grantees) are finding ever more ingenious ways of converting skin, fat and other starting tissues into embryonic-like stem cells, adult cell types, and now in-between progenitors, each of which could be useful in their own way for understanding and treating disease.

PNAS, April 26, 2011
CIRM Funding: Sheng Ding (RN1-00536-1); Stuart Lipton (RC1-00125-1); Maria Talantova (T2-00004)

- A.A.

Tags: direct reprogramming, ding, Gladstone, University of California San Diego, Lipton, Scripps, Sanford-Burnham

Source URL: https://www.cirm.ca.gov/blog/04262011/cirm-grantees-directly-create-neuronal-stem-cells-research-and-therapies